Original Article

Long-Term Follow-up of Autologous Fibroblast Transplantation for Facial Contour Deformities, A Non-Randomized Phase IIa Clinical Trial

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Abstract

Objective: Recently, the promising potential of fibroblast transplantation has become a novel modality for skin rejuvenation. We investigated the long-term safety and efficacy of autologous fibroblast transplantation for participants with mild to severe facial contour deformities.

Materials and Methods: In this open-label, single-arm phase IIa clinical trial, a total of 57 participants with wrinkles (n=37, 132 treatment sites) or acne scars (n=20, 36 treatment sites) who had an evaluator's assessment score of at least 2 out 7 (based on a standard photo-guide scoring) received 3 injections of autologous cultured fibroblasts administered at 4-6 week intervals. Efficacy evaluations were performed at 2, 6, 12, and 24 months after the final injection based on evaluator and patient's assessment scores.

Results: Our study showed a mean improvement of 2 scores in the wrinkle and acne scar treatment sites. At sixth months after transplantation, 90.1% of the wrinkle sites and 86.1% of the acne scar sites showed at least a one grade improvement on evaluator assessments. We also observed at least a 2-grade improvement in 56.1% of the wrinkle sites and 63.9% of the acne scar sites. A total of 70.5% of wrinkle sites and 72.2% of acne scar sites were scored as good or excellent on patient assessments. The efficacy outcomes remained stable up to 24-month. We did not observe any serious adverse events during the study.

Conclusion: These results have shown that autologous fibroblast transplantation could be a promising remodeling modality with long-term corrective ability and minimal adverse events (Registration Number: NCT01115634).

Keywords: Cell Therapy, Skin Rejuvenation, Wrinkle

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Introduction

Fibroblasts are the predominant cells of connective tissue that synthetize and organize collagen and other extracellular matrix (ECM) proteins. Furthermore, Fibroblasts secrete soluble cytokines and growth factors such as transforming growth factor-beta (TGF-β), keratinocyte growth factor (KGF), vascular endothelial growth factor (VEGF), and insulin-like growth factor (IGF) to maintain the structural integrity of the skin (1-3).

Skin aging is a complex, multifactorial process defined by progressive loss in skin integrity and function (4). The size, amount, and potency of fibroblasts chronologically decline due to natural cellular and molecular events such as reductions in TGF-β, micro-environment alterations, and Notch signaling disruption (5-8). Aged-fibroblasts secrete higher levels of matrix metalloproteinase that degrade collagen fibrils (9). Since a reciprocal mechanical force between fibroblasts and collagen fibrils is necessary for continuous collagen synthesis, degraded collagen fragments cause a breakdown in the tissue cycle (3, 10, 11).

On the other hand, destruction of fibroblasts and consequent collagen loss seen in acne scars result from a healing defect after local and systemic inflammation. This defect leads to destruction of the dermal structures with subsequent fibrosis (12, 13). Acne scars occur in 95% of acne participants even during standard treatments, in